

WHAT IS CLAIMED IS:

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1. A managing apparatus of a semiconductor manufacturing apparatus, comprising:

power measuring means for measuring electrical power consumption of electrical equipment used in the semiconductor manufacturing apparatus;

10 utility measuring means for measuring an amount of a fluid that is a utility that is manufactured or processed;

15 means for obtaining an amount of electric power consumed when manufacturing or processing the fluid based on values measured by the utility measuring means;

20 energy consumption calculating means for adding together the electrical power consumption of the electrical equipment and the amount of electric power consumed when manufacturing or processing the fluid and obtaining energy consumption of the apparatuses used in semiconductor manufacturing on a per-unit basis;

25 factor measuring means for measuring factors needed to obtain the amount of heat discharged from the equipment used in the apparatus used in semiconductor manufacturing;

30 discharged heat amount calculating means for obtaining an amount of heat discharged on a per unit basis from the apparatus used in the semiconductor manufacturing based on values measured by the factor measuring means; and

35 display means for displaying the amount of heat discharged as obtained by the discharged heat calculating means and displaying the energy consumption as obtained by the energy consumption

calculating means.

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2. The managing apparatus of claim 1,
wherein the fluid that is a utility is a temperature
control fluid that controls the temperature of the
equipment.

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3. The managing apparatus of claim 1,
15 wherein the fluid that is a utility is air that
flows through an interior of the apparatus used in
semiconductor manufacturing.

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4. The managing apparatus of claim 1,
wherein the fluid that is a utility is a gas used in
the apparatus used in semiconductor manufacturing.

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5. The managing apparatus of claim 1,
30 wherein the fluid that is a utility is water used in
the apparatus used in semiconductor manufacturing.

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6. The managing apparatus of claim 1,
wherein the apparatus used in semiconductor

manufacturing includes equipment contained within a housing provided inside a clean room, and the discharged heat includes heat discharged from the equipment into the clean room via an interior of the
5 housing.

10 7. The managing apparatus of claim 6,
wherein the factor measuring means includes:

 a first temperature measuring means for
measuring a temperature inside the housing;
 a second temperature measuring means for
15 measuring a temperature outside the housing; and
 means for obtaining an amount of heat
discharged from inside the housing to outside the
housing based on the measured temperatures inside
the housing and outside the housing.

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 8. The managing apparatus as claimed in
25 claim 7, comprising means for providing a plurality
of measuring points measured by the first
temperature measuring means and the second
temperature measuring means, operating the apparatus
used in the semiconductor manufacturing under a
30 variety of conditions and tracking the temperature
at each measuring point, establishing an
interrelationship between certain measuring points
and other measuring points and producing a
calibration curve, and estimating measurements at
35 other measuring points based on measurements at
certain measuring points and on the calibration
curve.

9. The managing apparatus as claimed in
claim 7, wherein:

the factor measuring means includes wind
speed measuring means for measuring a wind speed
5 inside the housing and a wind speed outside the
housing; and

wind speed measurements are included in a
equation for obtaining the amount of heat discharged
from inside the housing to outside the housing.

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10. The managing apparatus as claimed in
15 claim 6, wherein the apparatus used in semiconductor
manufacturing includes:

an exhaust path for exhausting the inside
of the housing and removing the heat from inside the
housing to outside the clean room; and

20 the amount of heat discharged includes heat
removed through the exhaust path by a gas exhausted
from the exhaust system.

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11. The managing apparatus as claimed in
claim 10, wherein the factor measuring means
includes:

30 exhaust path temperature measuring means
for measuring a temperature inside the exhaust path;
exhaust path wind speed measuring means for
measuring wind speed inside the exhaust path; and
means for obtaining an amount of heat
35 discharged by the gas exhausted through the exhaust
path based on measurement results obtained by the
exhaust path temperature measuring means and the

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exhaust path wind speed measuring means, a cross-sectional surface area of the exhaust path and the temperature inside the clean room.

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12. The managing apparatus of claim 1,
wherein the apparatus used in the semiconductor
10 manufacturing includes equipment cooled by a cooling
fluid that flows along a flow path and the amount of
heat discharged includes an amount of heat removed
by the cooling fluid.

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13. The apparatus of claim 12, wherein the
factor measuring means includes flow measuring means
20 for measuring a flow of the cooling fluid and the
apparatus obtains a heat amount removed by the
cooling fluid based on flow measurements and a
difference in temperature between the cooling fluid
on the intake side of the equipment and the cooling
25 fluid on the exhaust side.

30 14. The managing apparatus of claim 13,
comprising:

a computer that includes the discharged
heat calculating means, the energy consumption
calculating means and the display means; and

35 a signal conversion unit for converting
measurement results of the factor measuring means to
signals that can be processed by the computer.

15. The managing apparatus as claimed in
claim 14, wherein the computer and the signal
conversion unit are provided on a cart.

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16. The managing apparatus as claimed in
claim 14, including the factor measuring means
10 detachably attached to the measuring point and
further connected via wiring to the signal
conversion unit.

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17. The managing apparatus as claimed in
claim 14, including the factor measuring means that
cannot be detached from the measuring point, the
20 factor measuring means being connectible to as well
as detachable from the signal conversion unit by
wiring.

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18. The managing apparatus as claimed in
claim 1, comprising:
operating cost measuring means for
30 measuring measurement items related to an operating
cost of the apparatus used in semiconductor
manufacturing; and
means for performing calculations using
measurement results from the operating cost
35 measuring means and a cost conversion factor
calculated from numerical values corresponding to
those measurement items and obtaining per-unit cost

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of the apparatus used in the semiconductor manufacturing apparatus as a sum total of the results of the calculations,

5 the managing apparatus displaying the per-unit operating costs of the apparatus used in the semiconductor manufacturing at the display means.

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19. The managing apparatus of claim 18, wherein:

15 the operating cost measuring means utilizes the measuring means used when obtaining the amount of heat discharged and the energy consumption on a per-unit basis of the apparatuses used in semiconductor manufacturing; and

20 the measurement results from the operating cost measuring means include the power consumption of the electrical equipment and an amount of power consumed when manufacturing or processing the fluid that is the utility,

25 the cost conversion factor corresponding to the power consumption being the power consumption unit cost.

30 20. The managing apparatus of claim 18, wherein the semiconductor manufacturing apparatus comprises the equipment contained within the housing provided inside the clean room, the exhaust path for exhausting the inside of the housing and removing such exhaust outside of the clean room, and an exhaust fan provided on the exhaust path,

 the operating cost measuring means being a

means for measuring the exhaust gas air flow of the exhaust system, the cost conversion factor corresponding to the exhaust gas air flow being a cost per unit of air flow and a cost per unit of
5 exhaust fan exhaust air flow of relevant systems equipment including an outside air processor when taking outside air into the clean room via the outside air processor.

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21. The managing apparatus as claimed in claim 18, wherein the apparatus used in the
15 semiconductor manufacturing has equipment cooled by the cooling fluid that flows along the flow path, and the operating cost includes a cooling cost obtained by performing calculations using the amount of heat discharged from the equipment to the cooling
20 water and the unit cost of cooling the cooling water.

25 22. The managing apparatus of claim 18, wherein the apparatus used in the semiconductor manufacturing comprises equipment contained within the housing provided in the clean room and an exhaust system that exhausts the inside of the
30 housing and cools the heat inside the housing,

and the operating cost includes a cooling cost obtained by performing calculations using the amount of heat discharged to the exhaust system and the unit cost of cooling with the exhaust system.

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23. The managing apparatus of claim 18,

wherein the apparatus used in the semiconductor manufacturing comprises equipment contained in the housing provided inside the clean room, and the operating cost includes a cooling cost obtained by
5 performing calculations using the amount of heat discharged from the equipment to the clean room via the inside of the housing and the unit cost of cooling with a cooling system that cools circulatory air inside the clean room.

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24. The managing apparatus of any of claims
15 1 through 23, comprising:

carbon dioxide emission measuring means for measuring measurement items relating to carbon dioxide emissions converted for the apparatuses used in semiconductor manufacturing; and
20 means for performing calculations using measurement results from the carbon dioxide emission measuring means and carbon dioxide emission conversion factors corresponding to those measurement items and obtaining a per-unit carbon dioxide emission level for the apparatus used in the semiconductor manufacturing apparatus as a sum total
25 of the results of the calculations,

displaying the per-unit carbon dioxide emission level for the apparatus used in the
30 semiconductor manufacturing so obtained at the display means.

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25. The managing apparatus of claim 24,
wherein the measurement result includes power

consumption of the electrical equipment measured when obtaining power consumption on a per-unit basis for the apparatus used in the semiconductor manufacturing and an amount of power consumed when

- 5 manufacturing or processing a fluid that is a utility, and

the carbon dioxide emission conversion factor used for calculating with these power consumptions is a crude oil conversion coefficient
10 that indicates an amount of carbon dioxide generated when producing a unit of electrical power.

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26. The managing apparatus of claim 24, wherein the apparatus used in semiconductor manufacturing includes:

- 20 equipment contained in the housing provided in the clean room; and

means for obtaining power consumption consumed by the clean room cooling system that corresponds to an amount of heat discharged into the clean room from the equipment via the inside of the
25 housing and including a generated amount of carbon dioxide converted by multiplying the power consumption by the crude oil conversion coefficient in an amount of carbon dioxide generated on a per-unit basis for the apparatus used in the
30 semiconductor manufacturing

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27. The managing apparatus of claim 26, including:

temperature measuring means for measuring

the temperature inside the housing, temperature measuring means for measuring means for measuring the temperature outside the housing, and means for obtaining the amount of heat discharged from inside
5 the housing to outside the housing based on the temperatures inside the housing and outside the housing,

and further having means for setting a plurality of measuring points to be measured by the
10 temperature measuring means, operating the apparatus used in the semiconductor manufacturing under a variety of conditions and tracking the temperature state at each measuring point, establishing an interrelationship between certain measuring points
15 and other measuring points and producing a calibration curve, estimating measurements at other measuring points based on measurements at certain measuring points and on the calibration curve, and obtaining an energy consumption consumed by the
20 cooling system that corresponds to the amount of heat discharged into the clean room using the estimated temperature values.

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28. The managing apparatus of claim 24,
comprising:

fuel gas consumption measuring means for
30 measuring an amount of fuel gas consumed in the combustion of exhaust gas exhausted from the apparatus used in the semiconductor manufacturing;

carbon dioxide emission measuring means for multiplying the measurements by an amount of carbon
35 dioxide generated for combusting fuel gas on a per-unit basis and obtaining an amount of carbon dioxide generated; and

means for including the carbon dioxide emissions obtained by the carbon dioxide emission measuring means in the amount of carbon dioxide generated on a per-unit basis for the apparatus used 5 in semiconductor manufacturing.

- 10 29. A managing method of a semiconductor manufacturing apparatus, including the steps of:
 measuring power consumption of electrical equipment used in the semiconductor manufacturing apparatus;
- 15 measuring an amount of a fluid that is a utility that is manufactured or processed and obtaining an amount of power consumed when manufacturing or processing the fluid based on the measured value;
- 20 adding the electrical equipment power consumption and the amount of power consumed when manufacturing or processing the fluid based on the measured value and obtaining energy consumption on a per-unit basis for the apparatus used in the 25 semiconductor manufacturing;
- measuring factors needed to obtain an amount of heat discharged from the equipment used in the semiconductor manufacturing apparatus and obtaining an amount of heat discharged on a per-unit 30 basis for the semiconductor manufacturing apparatus based on the measurements; and
 displaying the energy consumption and the amount of heat discharged on a per-unit basis for the semiconductor manufacturing apparatus.

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30. The managing method of a semiconductor

manufacturing apparatus of claim 29, wherein:

- the semiconductor manufacturing apparatus includes equipment contained within a housing provided inside a clean room, an exhaust path for
- 5 exhausting an interior of the housing and removing heat from the interior of the housing to outside the clean room, and equipment that is cooled by a cooling fluid that flows along a flow path; and
- the amount of heat discharged includes an
- 10 amount of heat discharged from the equipment contained inside the housing to the clean room via the inside of the housing, an amount of heat removed by a gas exhausted from the exhaust path, and an amount of heat removed by the cooling fluid.
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31. The managing method of claim 29,
20 including the steps of:

- measuring a measurement item related to an operating cost of the apparatus used in semiconductor manufacturing, performing calculations using those measurement results and a cost
25 conversion factor calculated from numerical values corresponding to the measurement items, obtaining a per-unit cost of the apparatus used in the semiconductor manufacturing as a sum total of the results of the calculations, and displaying the cost
30 on a display means.

- 35 32. The managing method of any one of claims 29 through 31, including the steps of:
measuring measurement items related to a

converted carbon dioxide emission level for the apparatus used in the semiconductor manufacturing; performing calculations using the measurement results obtained in the preceding step 5 and a carbon dioxide emission level conversion factor corresponding to those measurement items, and obtaining a per-unit carbon dioxide emission level of the apparatus used in the semiconductor manufacturing as a sum total of the results of the 10 calculations; and displaying the results obtained in the preceding step on the display means.